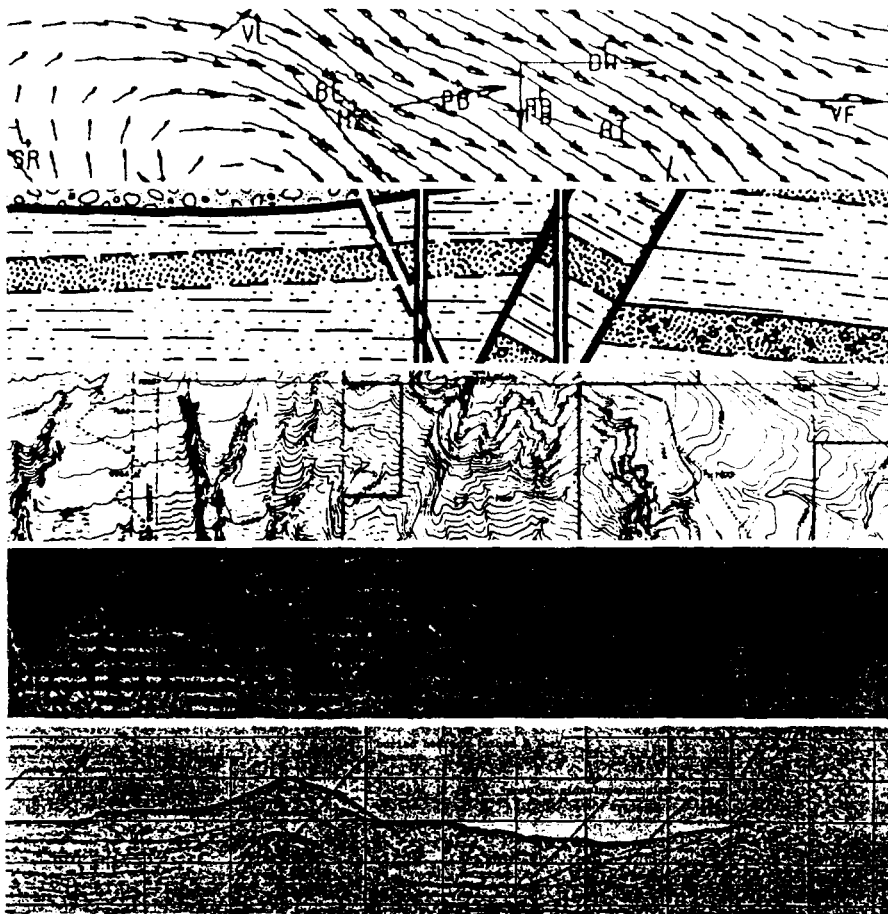


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WAT 019080

REPORT
GEOHYDROLOGIC STUDIES
THREE CLOSED LANDFILLS
MEDIUM TRANSFORMER OPERATION
ROME, GEORGIA
FOR GENERAL ELECTRIC COMPANY

SEPTEMBER 29, 1987

A PROFESSIONAL LIMITED PARTNERSHIP
Dames & Moore



Atlanta, Georgia
Job No. 1674-166

WAT 019081



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455 EAST PACES FERRY ROAD, SUITE 200, ATLANTA, GEORGIA 30305 (404) 262-0000

September 29, 1987

General Electric Company
Redmond Circle
Rome, Georgia 30161

Attention: Mr. Richard Lester
Environmental Engineer

Gentlemen:

Re: Report
Geohydrologic Studies
Three Closed Landfills
Medium Transformer Operation
Rome, Georgia
For General Electric Company

We are pleased to present three copies of our report for the geohydrologic study performed for the Medium Transformer Operation of General Electric Company in Rome, Georgia. This report presents the details concerning the installation of eleven monitoring wells, results of the chemical analysis on ground water samples obtained from those wells, and our recommendations for future site characterization.

Dames & Moore appreciates your use of the firm's professional services on this project, and would be pleased to address any questions that might arise concerning the content of this report.

Yours very truly,

DAMES & MOORE

Dale P. Voykin
Senior Hydrogeologist

William G. Smith, P.G.
Senior Geologist/Technical Manager

DPV/WGS/srb
Attachment

WAT 019082

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REPORT
GEOHYDROLOGIC STUDIES
THREE CLOSED LANDFILLS
MEDIUM TRANSFORMER OPERATION
ROME, GEORGIA
FOR GENERAL ELECTRIC COMPANY

1.0 INTRODUCTION

This report includes detailed descriptions and results of the installation of ground water monitoring wells at the General Electric Medium Transformer Operation Facility in Rome, Georgia.

Dames & Moore was retained by the General Electric Company (GE) to provide professional services for the installation of a ground water monitoring network in the vicinity of three closed and inactive trash landfills at the medium transformer operation. The three landfills were reported under Superfund as closed facilities which had not been operated since 1975. The State of Georgia Environmental Protection Division (EPD) inspected the landfills and concluded that the closure of the landfills at the time was proper and that no further action was necessary.

A Part B application was submitted for the medium transformer operation in 1985. The three landfills are sites covered under prior releases and thus, under the 1984 Resource, Conservation, and Recovery Act (RCRA) Amendments, are subject to regulation. Accordingly, Georgia EPD requested that the landfills be investigated to assess the possibility of contamination of the ground water beneath the site. A Phase I investigation was completed by Law Environmental Services, which consisted of an aerial survey, establishment of benchmarks, a geophysical survey to determine approximate landfill boundaries and probable routes of migration, and the selection of approximate locations for indicator monitoring wells.

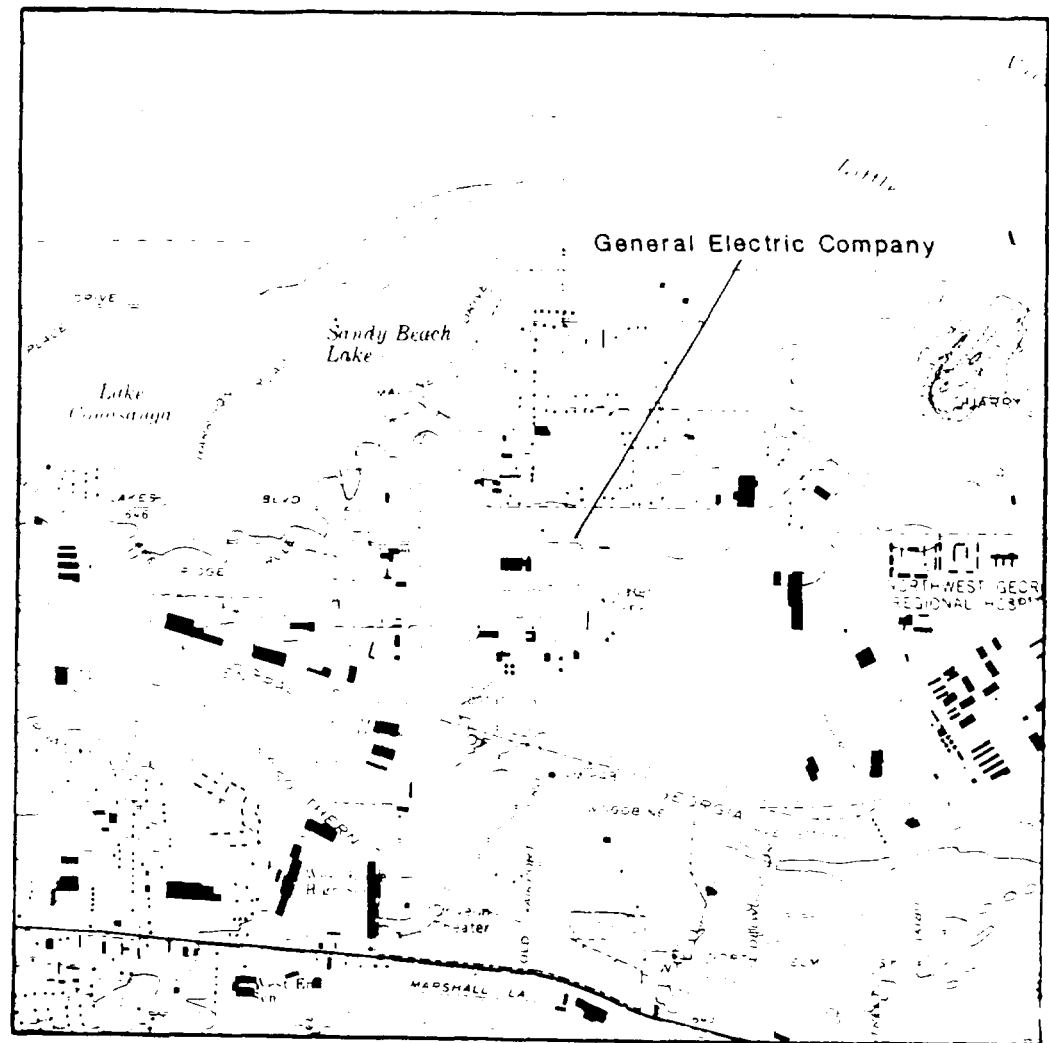
2.0 SCOPE OF SERVICES

The purpose of the study was to characterize site geohydrology in the vicinity of the landfills and to assess the possibility of ground water contamination from leachate emanating from these landfills. The following tasks were included:

1. Review of current information including geologic literature available for the site, as well as studies which have been performed previously and relevant portions of the Part B application.
2. Proposed monitoring well installation sites were reviewed and firm locations were established for each well.
3. A formal health and safety plan was developed to provide the basis for all field work to be performed at the site.
4. Eleven monitoring wells were constructed at the landfills (four at Site A, three at Site B, four at Site C). This installation included the provision of equipment, personnel, and direction of the actual installation of the wells.
5. The newly installed monitoring wells were sampled and analyzed for indicator parameters.
6. Static ground water level elevations were measured and evaluated to determine the direction of flow and possible migration of contamination as indicated by these wells.
7. All data were analyzed using various accepted methods and the results form the basis for the presentation in this report.

3.0 SITE-DESCRIPTION

The General Electric medium transformer operation is located in Rome County, Georgia approximately 2 3/4 miles west/northwest of downtown Rome, Georgia. The facilities are located on the Rome North, Georgia 7 1/2 minute quadrangle produced by the United States Geological Survey (see Figure 3-1).



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Figure 3-1
VICINITY MAP

General Electric Company
Rome, Georgia

Source: U.S.G.S. 7.5 Minute Series
Rome North Quadrangle,
Georgia-Floyd Co.

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3.1 Physiography, Topography, and Climate

All of Floyd County is in the Valley and Ridge physiographic province, which consists chiefly of lowlands and hilly areas that range in altitude from about 600 - 1,000 feet.

Floyd County has a mild climate. Average January temperature is about 43°F and the average July temperature is about 80°F. Average annual precipitation is about 53 inches and includes only a small amount of snow.

3.2 Soils

According to information provided by the Soil Conservation Service, principal soils in the entire area of the General Electric facility are Conasauga-Urban land complex, with 2 - 10% slopes. The Conasauga series are described as consisting of moderately well drained soils with a typical depth to weathered shale bedrock ranging from 20 - 40 inches in depth. The typical profile consists of a surface layer of silt loam approximately 5 inches thick, underlain by a 30 inch subsoil layer of silty clay. The underlying material, to a depth of about 46 inches, consists of weathered bedrock and pockets of olive-brown clay.

Because of the clayey subsoil, Conasauga soils typically exhibit impeded drainage.

The soils in the Urban land series are those soils that have been altered by grading, cutting, and smoothing for various purposes.

3.3 Landfill Description

The landfills are located near the southwest corner of the plant (landfill A), the southeast corner of the property (landfill B), and due east of the plant (landfill C). Our present knowledge concerning activities at the sites are as follows:

Site A: This landfill consists of 7 acres and was essentially an open trench in which waste was placed and cover was added occasionally. The depth of the landfill is unknown, and the extent of the landfill is

only known insofar as it can be identified by geophysical methods. The landfill was closed with a clay cap and has a 12 inch crushed stone layer over about one-half of the landfill area. Landfill A was operated from 1952 through 1970.

Site B: This landfill is approximately one-half acre in size and also is of unknown depth. The landfill contains a clay cap of unknown thickness, covered with 12 inches of crushed stone. This landfill was active for 3 months during 1975.

Site C: This landfill consists of 10 acres and is covered with a clay cap of unknown thickness. The landfill has been planted in pine trees and is, generally, covered with vegetation. The approximate bounds of this site are visually apparent from the differing growth patterns between the replanted trees covering the site and the natural stands exterior to it. Landfill C was operated from 1970 to 1975, using individual cells.

3.4 Surface Drainage

Generally, surface drainage on the southeastern portion of the plant site in the vicinity of Landfills B and C drains in a southeasterly direction towards an unnamed tributary to Little Dry Creek, approximately one-half a mile southeast of the plant. This creek then drains in an easterly direction and discharges to the Oostanaula River.

Surface drainage along or in the vicinity of the southwest portion of the plant near Landfill A moves, generally, in a southerly direction to Horseleg Creek, approximately 3/4 of a mile south of the plant. This creek then drains easterly to the Cousa River.

4.0 GEOLOGY

4.1 Regional Geology

The GE plant is located in the northwestern part of Rome, Georgia, in the Valley and Ridge geologic province. The General Electric site

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is located near the axis of the northeast plunging Beach Creek anticline. According to detailed mapping by the Georgia Geologic Survey (Cressler, 1970), in the immediate vicinity of the GE plant the axial trace of this anticline runs from near the southwest corner of the property, through the plant, towards the northeast corner of the property. Hence, bedrock in the northwest corner of the plant should dip in a northwesterly direction; whereas, bedrock in the southeastern area of the plant should dip in a southeasterly direction. Bedrock is described as consisting of the Floyd Shale of Mississippian age.

In Floyd County, the Floyd Shale consists of a silty micaceous shale that has fairly rough bedding surfaces. Much of the shale is highly carbonaceous and, when fresh, is very dark gray to nearly black in color. Weathering however, bleaches the shale to a pinkish-purple hue.

The Floyd Shale also includes a limestone formation at its base that crops out at several localities in Floyd County and is quarried to make cement. This unit is composed primarily of a thickly to massively bedded medium-gray limestone. The detailed mapping by the Georgia Geologic Survey indicates that the nearest exposure of this basal unit to the General Electric plant is approximately 1 mile to the northeast at the Ledbetter Quarry.

4.2 Local Geology

During field reconnaissance on July 28, 1987, a bedrock outcrop was noted near the gate situated just east of the water tank along the western margin of Landfill C. At this location the strike and dip of the bedding were recorded as:

N47E, 5SE

Bedrock at this outcrop consists of a hard grayish-black micro-crystalline (Micrite) limestone. This same dark gray to grayish-black micrite was found in all of the completed monitoring wells constructed at the site (See logs Appendix 1). No shale was found at any of the monitoring well locations. We interpret this dark micro-crystalline

limestone to be the basal member of the Floyd shale, equivalent to the limestone presently being excavated at the Ledbetter Quarry.

5.0 SITE INVESTIGATIVE ACTIVITY

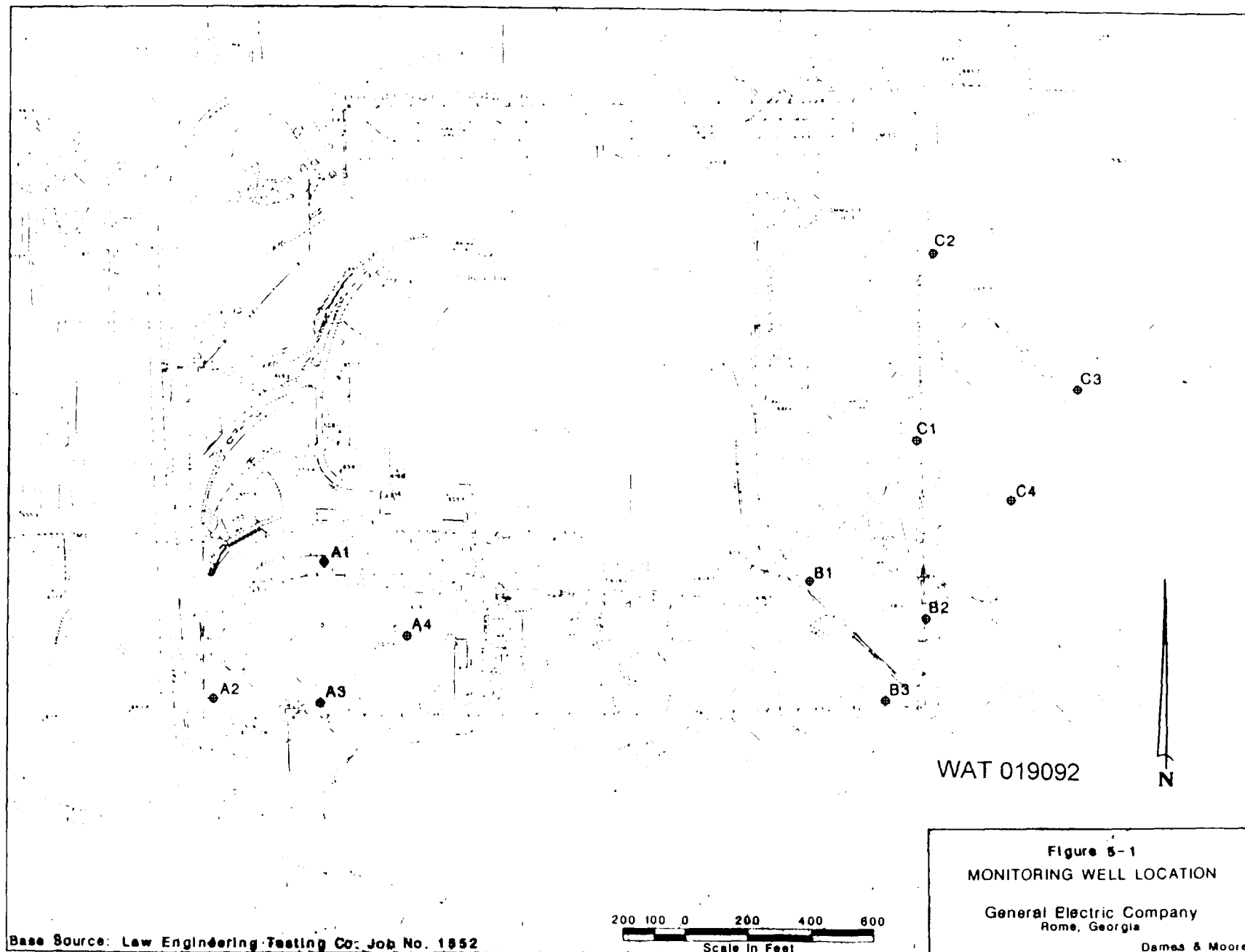
5.1 Monitoring Well Installation

5.1.1 Health and Safety

Prior to initiation of the drilling program a site-specific health and safety plan was developed by Dames & Moore. The details and requirements of this plan were transmitted and discussed with the sub-contracted drilling company representative at a meeting on the morning of August 6, 1987. This health and safety plan, which was adhered to during the drilling operations, required all field personnel to be in level D protection, with Level C materials available as a standby option. In accordance with the health and safety plan, during the drilling operations both the hole and spoil materials were monitored for volatile and combustible organic materials with a HNu photoionization detector (Model PL101) and a MSA explosimeter (Model 2A combustible gas indicator). The purpose of the monitoring was to comply with specific action levels (i.e. don Level C garb... evacuate) that had been developed for personnel safety. HNu and explosimeter readings are included on the well logs (Plates 1-13) located in the Appendix.

5.1.2 Monitoring Well Construction

During the period August 10 - August 27, 1987, eleven rock monitoring wells were installed in the vicinity of Landfills A, B and C (see Figure 5-1) by the drilling subcontractor, Environmental Exploration, Inc. (EEI). Additionally, two other wells (A1A and C4A) were started but eventually abandoned during the drilling process. A1A was abandoned and grouted (neat cement) in place because of caving conditions that occurred after coring that prevented installation of the monitoring well screens. Additionally, during the reaming procedure, the drilling tools were diverted down a parallel fracture near the top of rock. C4A was abandoned and grouted at shallow depth after it was determined that the drilling equipment had hit an immovable object in



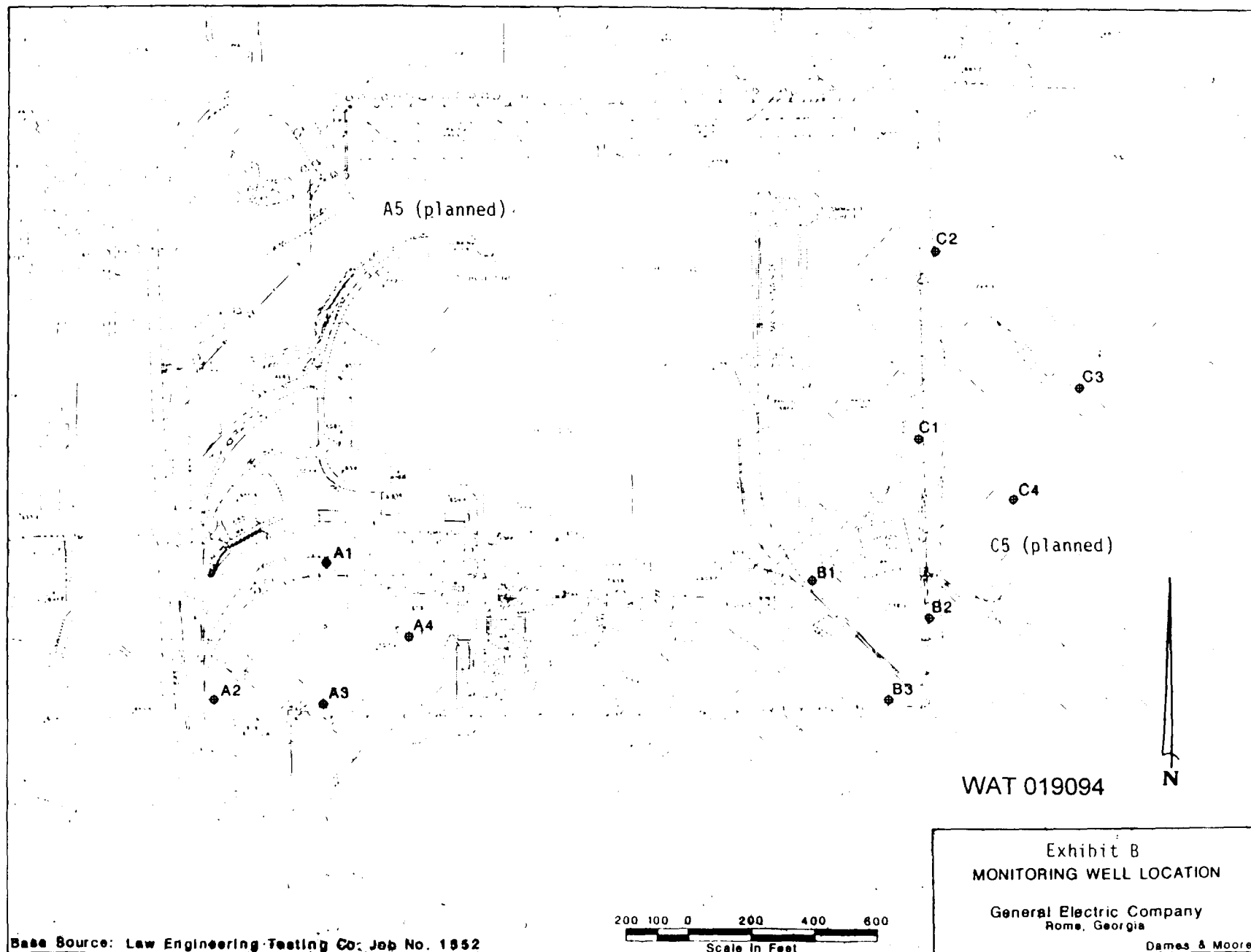
the former fill area of Landfill C. The locations of these two abandoned and sealed well sites have not been included on Figure 5-1 for brevity. For record, their locations are as follows:

A1A - 9.5 feet due west of A1

C4A - 50 feet due north of C4

Wells A1A, B2 and C1 were advanced to the top of rock using a 6 inch hollow stem auger, and soils were continuously sampled with a split spoon sampler. These holes were then advanced to depth using a 2 inch inner-diameter (I.D.) core barrel for a continuous record of the rock encountered. Cores were labeled and boxed on site for shipment to our laboratory for further study. After the coring operation was complete, the hole was then reamed to 4 inches with a tri-cone bit, prior to installation of a 2 inch diameter schedule 40 PVC riser and screen. Screens vary from 15 to 20 feet in length with a slot size of 0.010 inch (#10 slot). A gravel pack consisting of finely graded sand (20/30) was emplaced around the screen, extending at least 2 feet above the screen. A minimum 2 foot seal of bentonite pellets (1/4 inch) was then emplaced on top of the sandpack, and the remaining annular space was grouted to the surface with a neat cement grout. A protective steel outer casing set into the cement collar (with a lock and cap) completed the installation at each well. A diagrammatic representation of the typical monitoring well construction is shown on Figure 5-2. The specific details concerning the monitoring well construction are given on Table 5-1.

Using the information derived from the continuous soil sampling and rock cores at A1A, B2 and C1, the remaining wells were constructed in a slightly dissimilar but more rapid fashion. These wells were also advanced to the top of rock using hollow stem augering techniques, but unlike the previous wells where continuous split spoon sampling was performed, sampling at these wells consisted of grab samples at 5 foot intervals. After reaching the top of rock these wells were advanced to depth using a four inch tri-cone bit. Unlike the three cored wells the rock samples only consist of small chips recovered at the surface.



Since there is little control over the horizon from which these chips return and since they are quite small, the resulting logs contain less detail.

In those wells that were cored (A1A, B2, C1), rock cores were placed in core boxes, labeled and analyzed for the presence of fractures, percent recovery, and rock quality designation (RQD). The RQD represents a modified form of recording rock core recovery and indicates the degree of fracturing of bedrock. RQD is defined as follows:

$$\text{Percent RQD} = \frac{100 \times \text{length of core in pieces 4 inches and larger}}{\text{Hole length actually drilled}}$$

RQD is determined by totaling the lengths of core 4 inches and longer, while differentiating between natural breaks (joints, open bedding planes, etc.) and breaks caused by drilling. Breaks caused by drilling are not counted as breaks when measuring core lengths for the determination of RQD. Natural breaks in the core are distinguished by the presence of weathering products, secondary deposits, dullness, rounding produced by solution, and slickensides.

All solid waste (drilling muds, sediment, formation materials, etc.) generated by the drilling operations were placed in 55 gallon drums at each well site for final disposition at a later date.

5.1.3 Well Development and Completion

After installation, all wells were developed using an Ingersoll Rand 175 cubic feet/minute (CFM) air compressor equipped with a hydrocarbon filter to preclude contamination by motor fumes. Each well was surged and jetted by this device for approximately 60 minutes to clear the well of "fines" and to improve the flow into the well.

After well completion was accomplished, a vertical elevation survey for each well was performed by Williams, Sweitzer, and Barnum, Inc., consulting engineers of Rome, Georgia. The top of casing

elevations are included on Table 5-1. Horizontal locations were determined by direct measurements from physical locations at the GE plant site.

5.1.4 Decontamination Procedure

In order to minimize the potential for cross-contamination all drilling and sampling equipment was properly decontaminated prior to and between each use.

A high pressure steam cleaner was used to clean the drill rig, augers, drill rods and bits, and well materials prior to their installation. In addition, the jetting nozzle for the air-compressor was also steam cleaned, prior to and after each use. Later, water samples were retrieved using new dedicated bailers. A new length of polypropylene rope was used for each bailer during sampling.

5.2 Water Level Measurements

Throughout the course of the Dames & Moore investigation, water levels from the monitoring wells at the facility were obtained to determine the depths for well screen settings. Water level measurements within 24 hours of well installation are included on Table 5-1. They are, however, not to be interpreted as stable because of the dense nature of the crystalline bedrock and lack of fracturing at depth. Recharge to these wells was, therefore, extremely slow.

On September 11, 1987, approximately 2 weeks after well installation, water levels were again taken to determine static ground water conditions (see Table 5-2). Water levels were measured to 0.01 foot accuracy with an electronic water level indicator and recorded in the field book. These measurements were then converted into ground water elevation data and used to construct a ground water contour map showing direction of flow in the vicinity of the various landfills.

5.3 Ground Water Sampling

Ground water sampling for all of the newly installed monitoring wells was accomplished on September 11, 1987, approximately 2 weeks

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after well installation, to lessen the chemical changes caused by formation damage that occurs during any drilling operation. Prior to sampling, the monitoring wells were properly evacuated and sampled as described below.

5.3.1 Sampling Procedure

Water levels for each well were obtained using an electronic water level indicator. The volume of standing water in each well was then calculated based on the diameter and depth of the hole. Prior to sampling, in those wells with sufficient recharge, three times the calculated volume of water was then hand bailed using a new dedicated PVC bailer. In those wells where hand-bailing could evacuate the well for its entire length, only one volume of water was evacuated. After evacuation, samples were then obtained directly from each dedicated bailer at each well site.

5.3.2 Laboratory Analysis

Ground water samples were poured directly from each dedicated bailer into laboratory prepared sample containers with proper preservatives, packed on ice, and shipped via overnight courier directly to the laboratory. All analytical work was performed by Savannah Laboratories and Environmental Services, Inc. in Savannah, Georgia. All samples were collected and shipped under proper chain-of-custody procedures. Ground water samples collected on September 11, 1987 were analyzed for indicator parameters as defined under the RCRA Regulations (pH, specific conductance, total organic carbon, and total organic halogen).

6.0 RESULTS AND DISCUSSION

6.1 Site Geology

As previously discussed in Section 4.2, bedrock at the site at all drilling locations was found to consist of a dense grayish-black micro-crystalline (micrite) limestone. Because the drilling time estimates were based on bedrock being a shale, as described in all of the previous studies in this area, our drilling time estimates proved to be

somewhat longer than what had been anticipated. This time extension is due to the very hard dense nature of limestone, as compared to the much softer characteristic of shale.

Our original estimates for both soft and hard rock drilling were based on shale. Soft shale was defined as that material which would have been penetrated using only augering techniques. Whereas, hard shale (hard rock) would require penetration using the diamond-tipped core barrel and tri-cone roller bits. Although these same drilling techniques and equipment are used to penetrate limestone, the rate of penetration is far slower than the typical penetration rate for hard shales. Additionally, because of weathering conditions near the soil/rock interface, spalling rock and caving caused some problems that required an additional drilling step not previously described. This step consisted of seating a temporary 12 inch diameter protective drive/drill casing approximately 10 to 15 feet into bedrock prior to advancing the diamond-tipped core barrel. Initial efforts to core C1 without this method of protection resulted in the core barrel being trapped in the hole for a number of hours before retrieval efforts were successful.

Evidence of the greater hardness of the limestone versus that of shale can be found in the drilling record concerning tool wear on the job. The initial carbide tungsten tri-cone bit brought to the job for advancement of the holes was completely worn before the drilling tasks were half complete. A new carbide tungsten tri-cone bit was purchased and at completion of the final drilling, this bit had worn approximately 50%. Therefore, although the greater density and hardness of the limestone did not add to the estimated drilling cost, since those costs are based on a specified and fixed footage rate, the limestone bedrock encountered did result in additional drilling time which resulted in the expenditure of additional manhours.

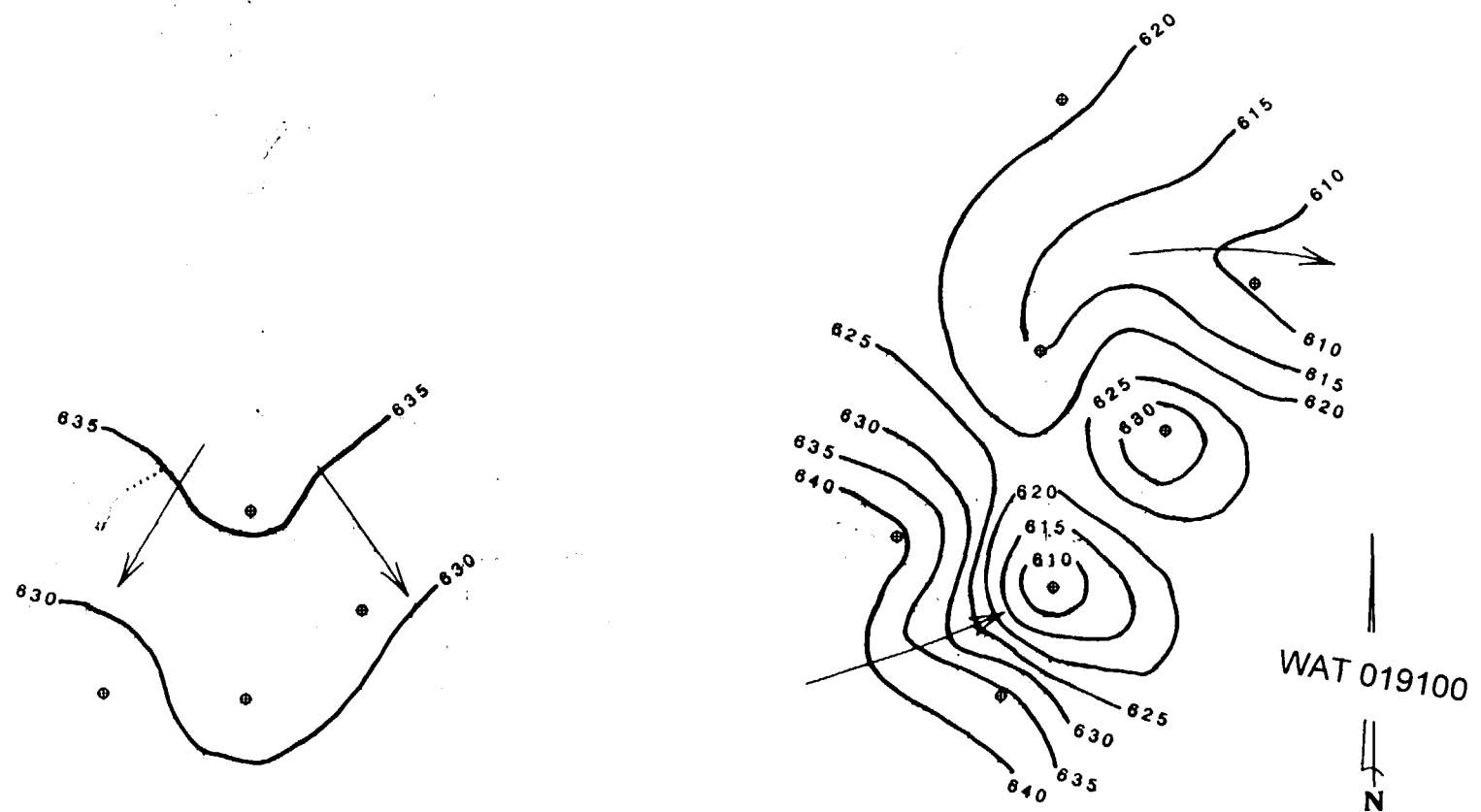
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6.2 Site Hydrogeology

Ground water, under semi-confined conditions, moves away from the plant site (generally) due to topographic controls. A water level contour map, based on the September 11, 1987 water level measurements (after water levels had stabilized), is included as Figure 6-1. Based on the contours presented on this figure, ground water in the vicinity of Landfill A moves, generally, in a southerly direction in a fashion similar to that exhibited by the surface drainage. At Landfills B and C, ground water flows in an easterly direction. Contouring between the two areas has not been attempted because of the lack of data. Further, it appears that there may be a ground water divide between these two areas that may coincide with the structural axis of the Beach Creek anticline.

Water level measurements of the recharge occurring in the monitoring wells after evacuation during both the drilling and sampling phases provided ample evidence for the slow movement of ground water in the massive crystalline limestone bedrock.

The massive relatively unfractured nature of the crystalline bedrock with depth also posed some difficulty in ground water level determinations in this area. As an example, at C4, located downslope and relatively near to the small unnamed tributary, we anticipated encountering a static water level at approximately 10 to 15 feet below the ground surface. During the drilling phase on August 25, however, the materials encountered at depth were extremely dry and the static water level was recorded (after 6 hours of recharge) at approximately 35 feet below ground level. On September 11, when the site was revisited for sampling purposes, the water level had risen to within 8 feet of the surface of the ground. Contrast these water levels with those found at monitoring well B2: B2 is located almost within the small tributary draining eastwards from Landfill B and water levels were anticipated to be found within 10 feet of the ground surface. After this well had been completed and approximately 6 to 8 hours of recovery, water levels were recorded in this well at about 39 feet below ground level. On



← Indicates Direction of Ground Water Flow
 625 — Ground Water Elevation above Mean Sea Level
 200 100 0 200 400 600
 Scale in Feet

Figure 6-1
 WATER TABLE CONTOUR MAP
 General Electric Company
 Rome, Georgia
 Sept. 11, 1987
 Dames & Moore

September 11, 1987, when water levels were again remeasured for the sampling phase, the water level was still located approximately 41 feet below ground level. These extreme variations in two wells located rather near to each other and in an area where water levels would be expected to be fairly shallow are typical of fracture flow regimes in carbonate terrain. Often times, wells located very near to each other may be penetrating different fracture systems and will therefore, exhibit very poor hydraulic connection. For graphing purposes, eliminating the data from these two "anomalous" monitoring wells results in the generation of much smoother contours that indicate that, regionally, ground water moves in a southeasterly direction away from Landfills B and C.

6.3 Indicator Parameter Characterization

Ground water samples collected on September 11, 1987 were analyzed for the RCRA indicator parameter (pH, specific conductance, total organic carbon, and total organic halogen). A copy of the completed laboratory analysis is provided in the Appendices and is summarized on Table 6-1.

Generally, the four indicator parameters are thought to reflect changes in the organic and inorganic makeup of ground water (Federal Register, May 19, 1980). Increases in specific conductance generally indicates the presence of inorganic substances in the ground water. Similarly, an increase or decrease in the pH suggests the presence of inorganic contamination. Total organic halogen (TOX) and total organic carbon (TOC) concentrations in ground water often increase as a result of organic contributions from extraneous sources.

Reviewing the water chemistry results from the September 10, 1987 sampling indicates several anomalous conditions. Typically, ground water in carbonate terrain would be expected to have a pH ranging from approximately 6.0 to 8.5. Hence, the pH found at A1 (4.5) is considered anomalous. It should be noted however, that A1 is the upgradient well for landfill A. Similarly, the specific conductance measured at

both A1 and C2 (950 and 900 microumhos/centimeter, respectively) are slightly anomalous with regards to the remaining values at the other monitoring wells. Again, both wells are located upgradient of the respective landfills that they monitor.

The total organic carbon content (TOC) values are highly variable. In general, wells A1, A2, A4, B2, B3 and C4 could be considered anomalous. In this instance, the anomalous values tend to predominate in the downgradient wells. With respect to total organic halogens (TOX) monitoring wells A1, A3, and A4 appear anomalous. Again, however, the highest value is recorded in the upgradient well, A1.

It should be emphasized that these results are based on a one point-in-time sampling. Further, because of the slow recharge rates observed and the estimated low bedrock permeability, the highly variable results (even with the two week lag time before sampling) may be the result of formation damage and/or contamination induced by the drilling processes. Alternatively, the anomalous readings may be indicative of minor ground water contamination.

Based on the results of this sampling, however, the indicator parameter levels found at monitoring well A1, the upgradient monitoring point for Landfill A, indicate that this well is far more anomalous than any of the other wells. This could suggest to some that the well was being effected by mounding (reverse flow) emanating from Landfill A. We note, however, that because this landfill was closed in 1970, any mounding that may have developed during the operation of this site that could have affected a nearby upgradient monitoring point would, by this time, be expected to have diminished. Additionally, water level contouring in this area does not provide any indication of mounding. Barring field error, lab error, and/or formation damage, the anomalous values detected in this well may indicate the presence of a contamination source further upgradient.

7.0 RECOMMENDATIONS

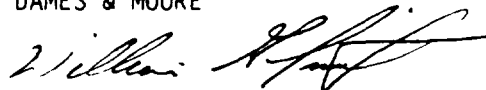
Because several of the water samples taken from the newly installed monitoring wells appear slightly anomalous, and because the greatest anomalies were noted in an upgradient well, it is recommended that a repetitive sampling schedule, on a periodic basis, be initiated at the General Electric monitoring wells. Repetitive sampling and analysis will provide a more thorough background documentation of ground water quality and may prove to mitigate the anomalies noted in the initial screening. Should repetitive sampling of the monitoring wells indicate a duplication of the present values, the chemical analyses suite should be expanded to include a qualification (and quantification) of the specific ions and compounds attributing to the anomalous indicator parameter values. At that time, General Electric may also wish to consider the installation of an additional monitoring monitoring well somewhat upgradient (north) of upgradient monitoring well A1.

-oOo-

The Bibliography and Appendices are attached and complete this report.

Respectfully submitted,

DAMES & MOORE



William G. Smith, P.G.
Senior Geologist/Technical Manager



Dale P. Voykin, CPGS 6983
Senior Hydrogeologist

/srb

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**A
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Table 1
MONITORING WELL CONSTRUCTION DETAILS

BORING #	GROUND SURFACE ELEVATION	TOP OF CASING (FOC) ELEVATION	DEPTH TO ROCK	ROCK ELEVATION	DEPTH TO WATER	WATER ELEVATION	TOTAL DEPTH WELL	BACKWASH VALVE	2.0 INCH SLOTTED SCREEN SECTION	SAND PACK FILTER ZONE	PELLETIZED BENTONITED SEAL	GROUT SEAL	2"WPVC STICK-UP	COMMENTS
A-1A	654.08		14.00	640.08	17.33	636.75								Cored 2-inch diameter boring to 36.5 ft. fragmented rock - unable to install monitoring well. Boring grouted to surface.
A-1	654.08	656.75	14.00	640.08	17.33	636.75	28.80	28.80-28.10	28.47-13.47	28.80-12.10	12.10-10.30	10.30-SFC	2.67'	
A-2	648.45	651.68	26.00	622.43	19.27	629.16	30.33	30.33-30.00	30.00-15.00	30.33-12.65	12.65-10.00	10.00-SFC	3.25'	Weathered rock identified at 26.00'. Hard rock identified at 61.50 feet.
A-3	651.73	654.19	13.00	638.94	19.69	632.25	23.13	23.13-22.83	22.83-12.83	23.13-10.91	10.91-8.65	8.65-SFC	2.25'	
A-4	656.77	659.77	33.30	623.47	24.96	631.81	38.25	38.25-35.40	35.40-20.40	38.25-18.42	18.42-15.53	15.53-SFC	3.00'	
B-1	653.65	656.65	23.83	629.82	12.00	641.65	34.68	34.68-34.38	34.38-14.38	34.68-12.8	12.80-9.70	9.70-SFC	3.00'	Drilled to 45.0 ft. grouted with bentonite pellets to 34.68 feet.
B-2	642.42	645.05	8.90	633.52	41.54	600.88	45.90	45.9-45.60	45.60-30.60	45.90-25.20	25.2-23.00	23.0-SFC	2.63'	
B-3	652.39	655.39	16.60	635.79	15.43	636.96	37.70	37.70-37.30	37.3-22.30	37.7-20.40	20.40-17.80	17.8-SFC	3.00'	
C-1	651.88	655.95	3.20	648.68	36.39	615.49	54.65	54.25-51.40	51.40-31.40	54.65-22.00	22.00-18.50	18.50-SFC	3.17'	
C-2	662.69	665.39	3.00	659.69	51.45	611.24	64.35	64.35-61.50	61.50-41.50	64.35-38.02	38.02-35.44	35.44-SFC	2.70'	
C-3	648.60	651.48	14.20	634.40	46.33	602.27	54.42	53.66-53.33	53.33-33.33	53.66-21.20	21.20-18.15	18.15-SFC	3.00'	
C-4	640.30	643.78	7.90	632.40	34.69	605.61	43.63	43.63-43.30	43.30-23.30	43.63-10.00	10.00-7.40	7.40-SFC	3.00'	

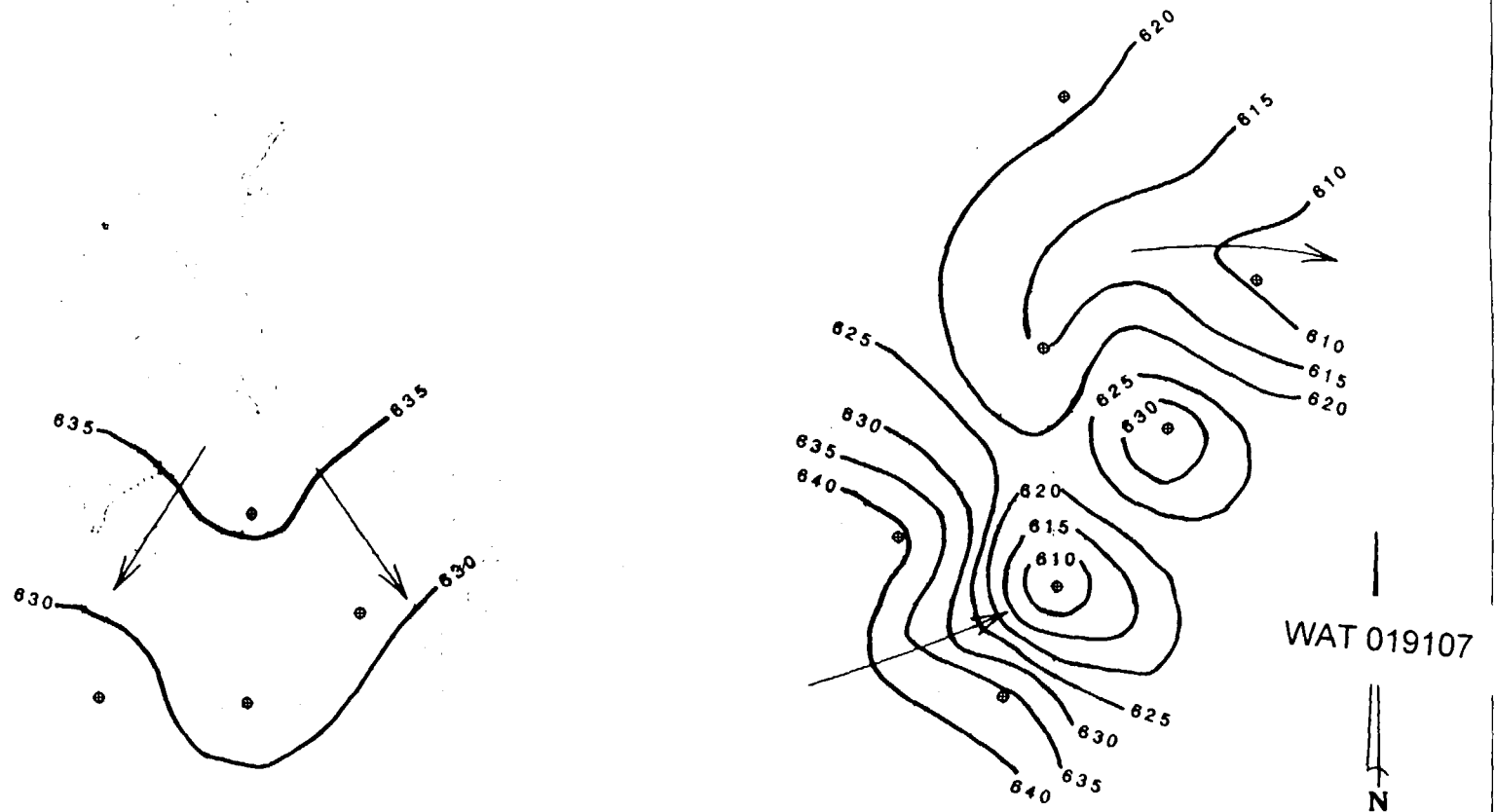
* All units expressed in feet.

* Ground water level measurements are final (last hour readings; 0830 8//28/87). Not to be interpreted as stable. Due to previous day well development efforts, most wells still in recharge mode.

* FOC = Surface

WAT 019105





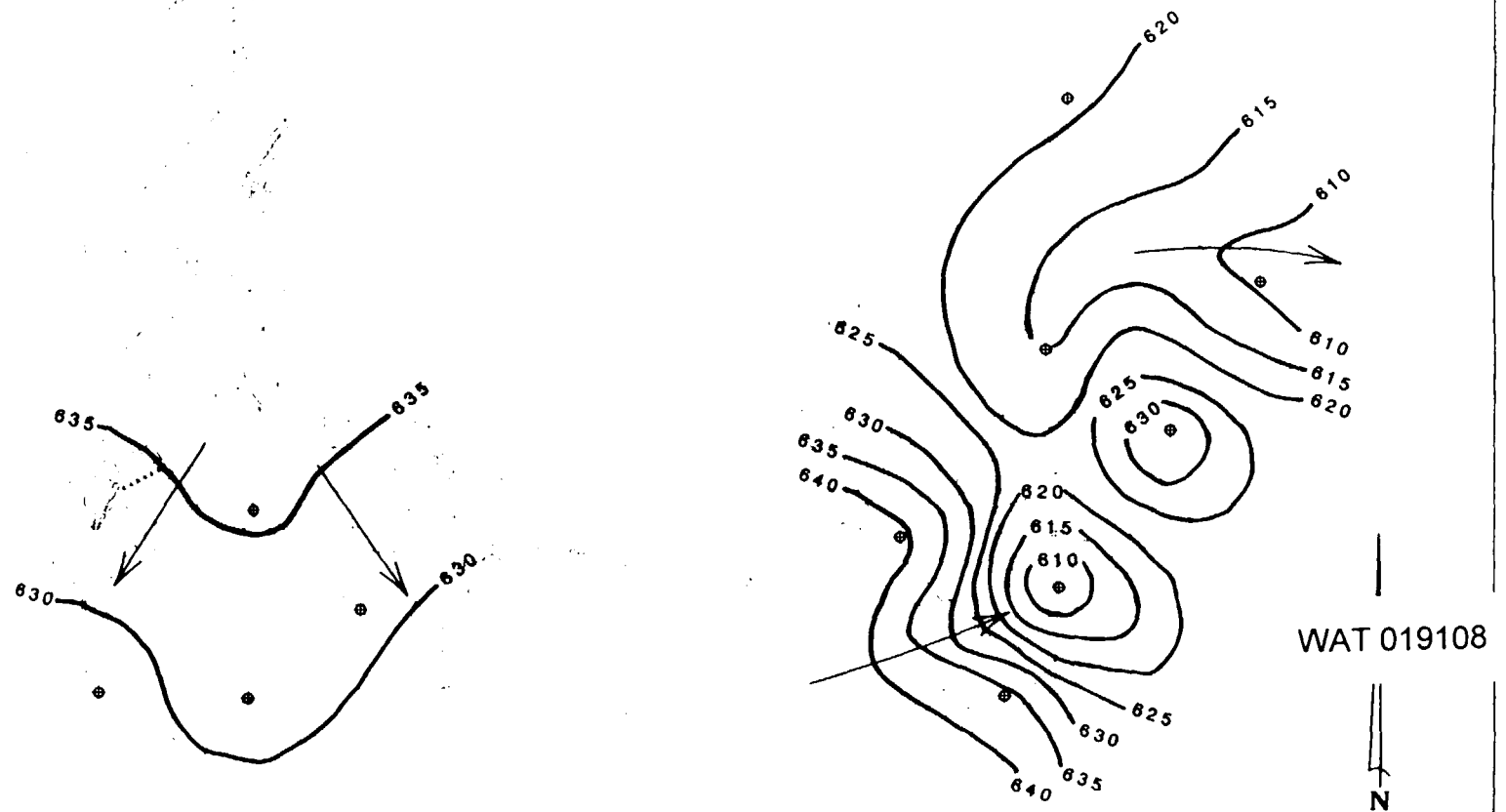
← Indicates Direction of Ground Water Flow
 625 — Ground Water Elevation above Mean Sea Level
 200 100 0 200 400 600
 Scale in Feet

Figure 6-1
 WATER TABLE CONTOUR MAP

General Electric Company
 Rome, Georgia

Sept. 11, 1967

Dames & Moore



← Indicates Direction of Ground Water Flow

625 — Ground Water Elevation above Mean Sea Level

200 100 0 200 400 600

Scale in Feet

Figure 8-1
WATER TABLE CONTOUR MAP

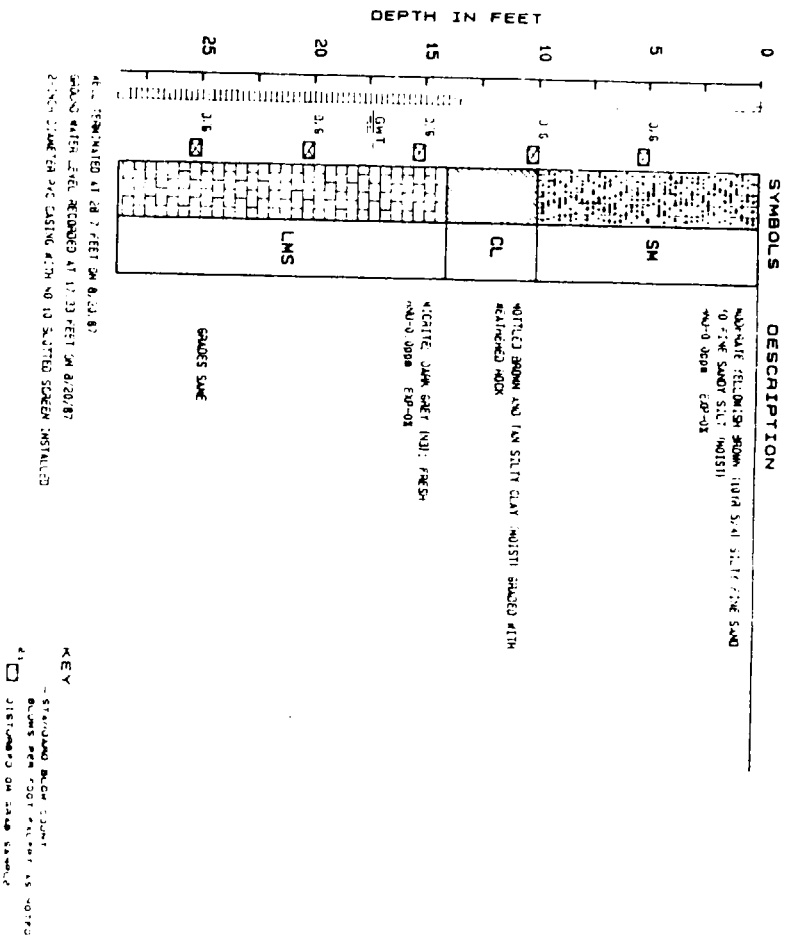
General Electric Company
Rome, Georgia

Sept. 11, 1987

Dames & Moore

WELL A-1

65-08 RE: (AC)



WELLS CONSTRUCTION

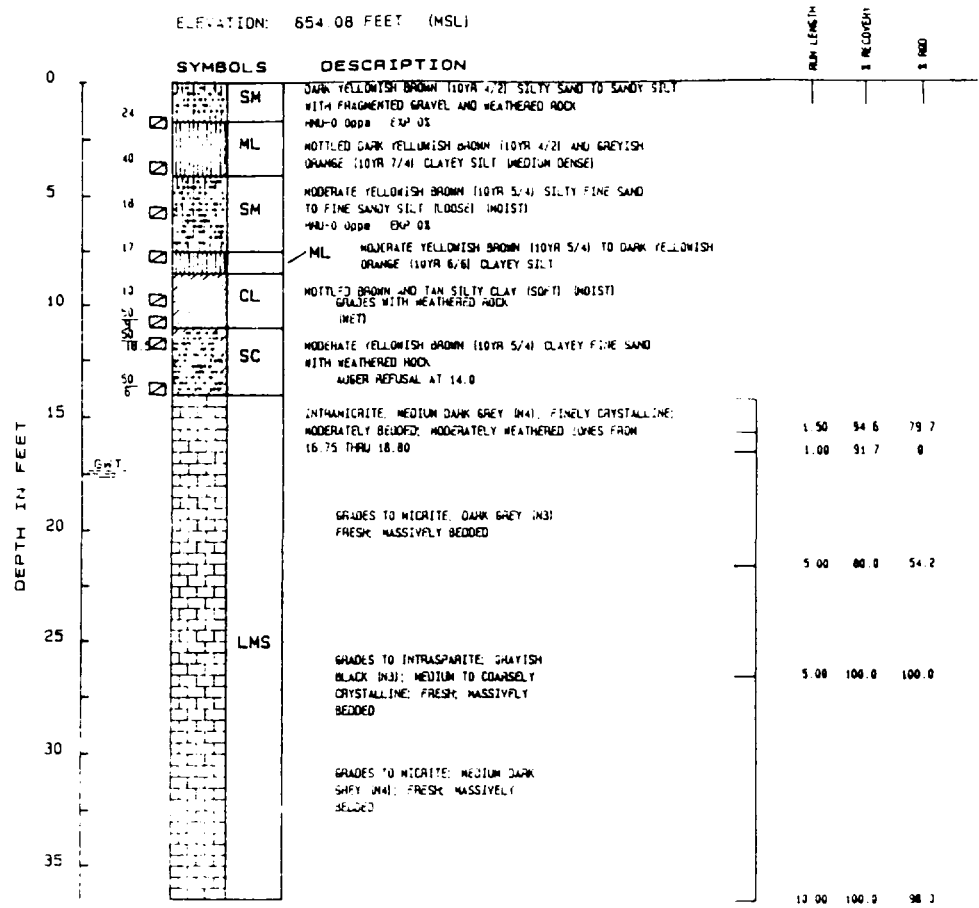
RECU CASING
RECU SCREEN
OPER. HOLE

LOG OF WELLS
DAMES & MOORE
PLATE 1

WAT 019109

WELL A-1A

ELEVATION: 654.08 FEET (MSL)



WELL TERMINATED AT 36.5 FEET ON 8/19/87
 GROUND WATER LEVEL RECORDED AT 17.33 FEET ON 8/20/87
 BORTING GROUTED TO SURFACE WITH A SLURRY-GROUT MIXTURE OF BENTONITE POWDER AND CEMENT

KEY

1. 1" LONG SPLIT SPOON
 2. 1" LONG SPLIT SPOON
 3. 1" LONG SPLIT SPOON

2. STANDARD SPLIT SPOON SAMPLER (SPT)

WELL CONSTRUCTION

WELL CASING
 WELL SCREEN
 OPEN HOLE

LOG OF WELLS

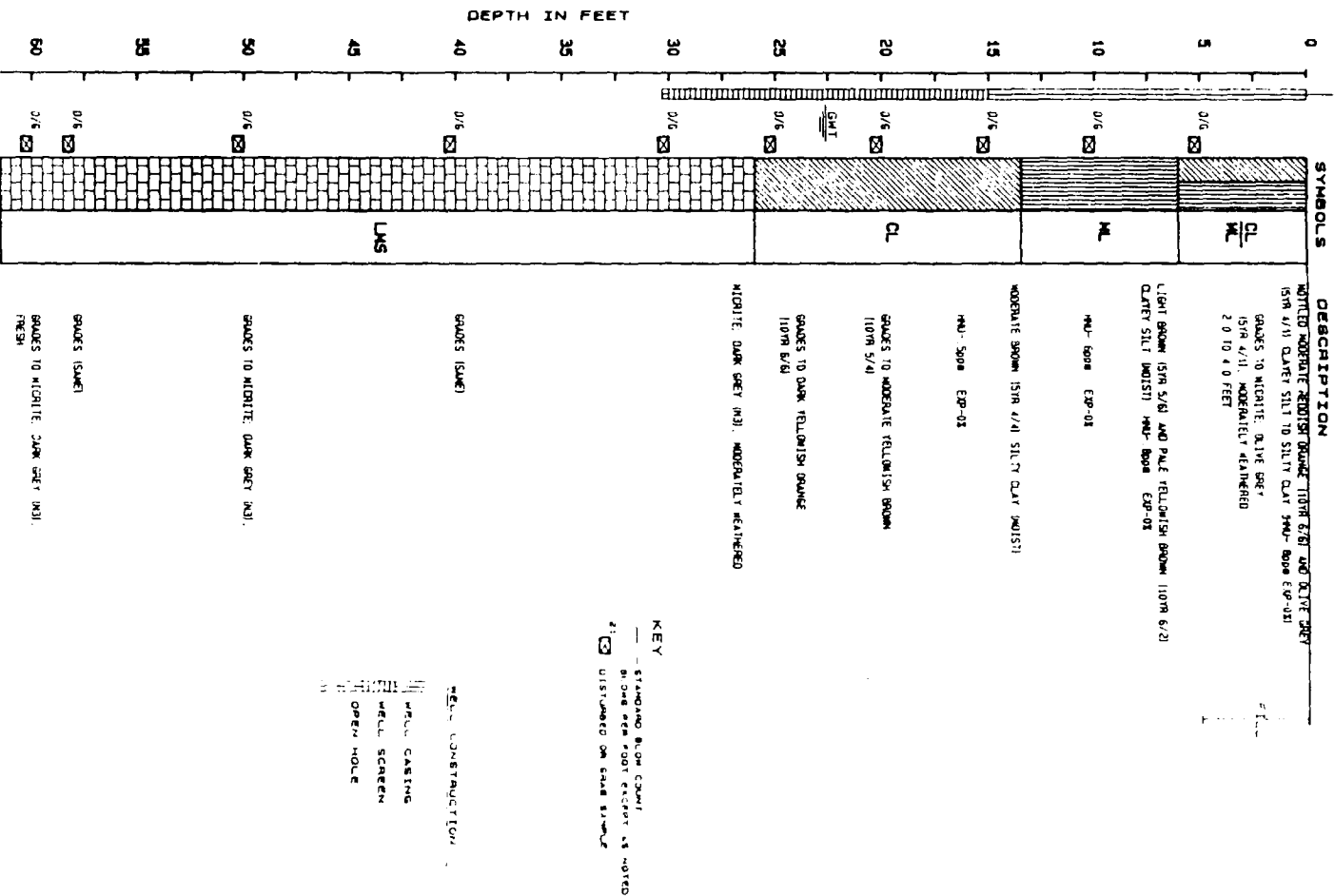
DAMES & MOORE

PLATE 2

WAT 019110

WELL A-2

ELEVATION: 648 43 FEET (MSL)



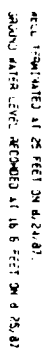
LOG OF WELLS

DAMES & MOORE

PLATE 3

WAT 019111

1950



STANDARD BLOW COUNT
BLOW PER FOOT EXCEPT AS NOTED
DISTURBED OR SENSITIVE

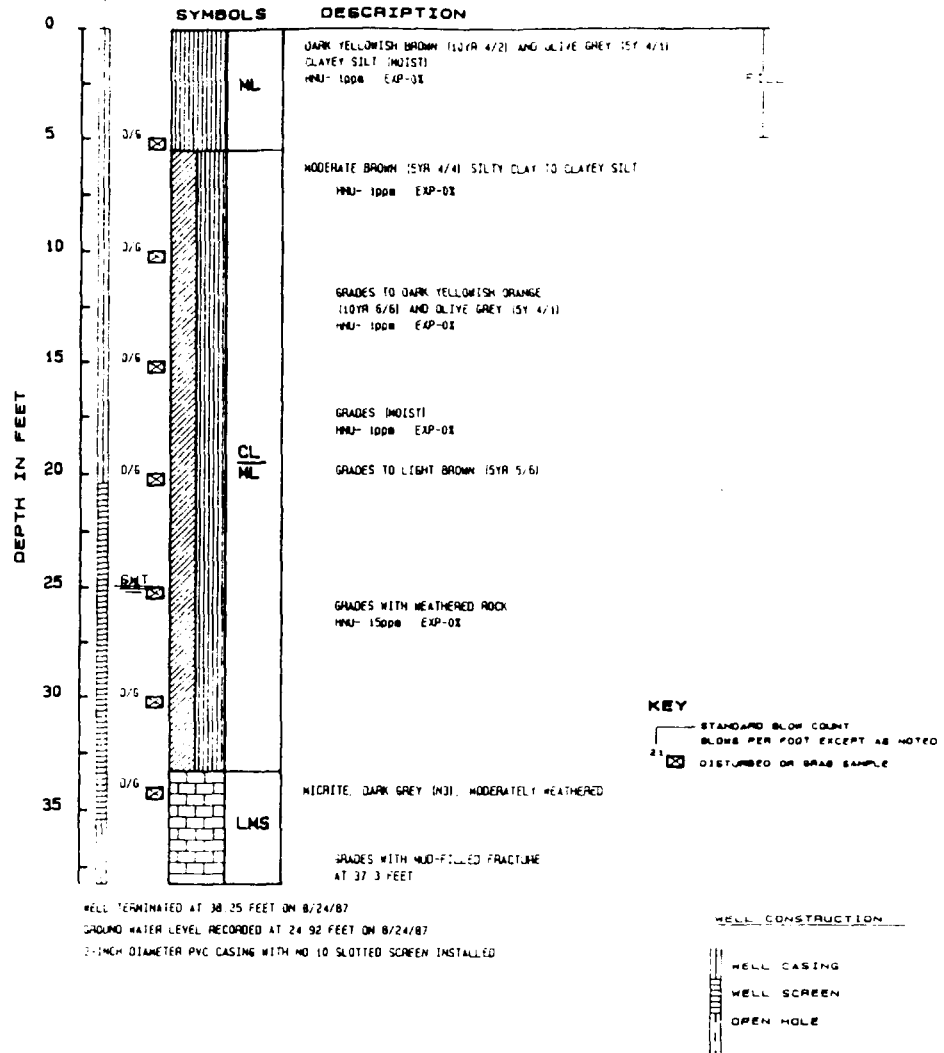
CASTING	REU
SCREEN	REU
ROLE	OPEN

PLATE 4

WAT 019112

WELL A-4

ELEVATION: 656.77 FEET (MSL)



LOG OF WELLS

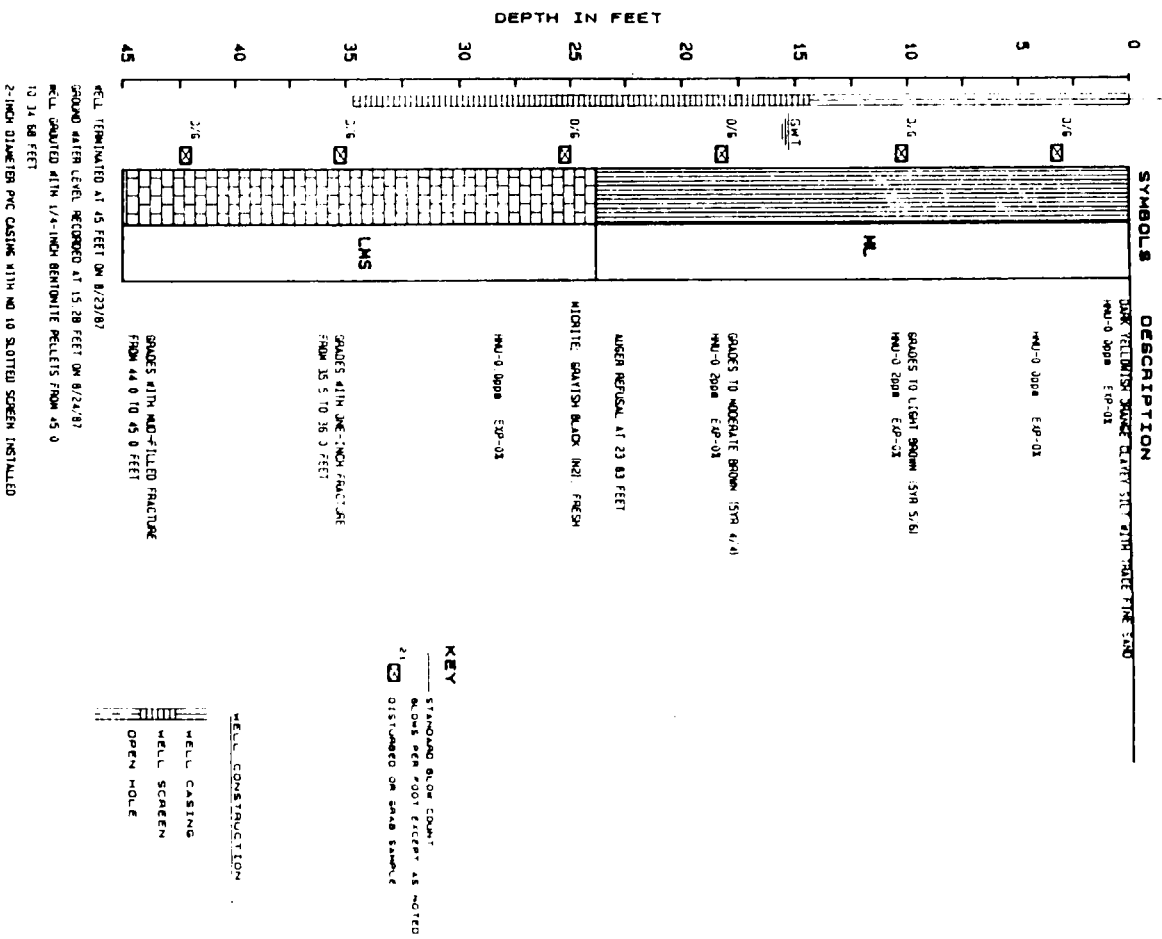
DAMES & MOORE

PLATE 5

WAT 019113

WELL B-1

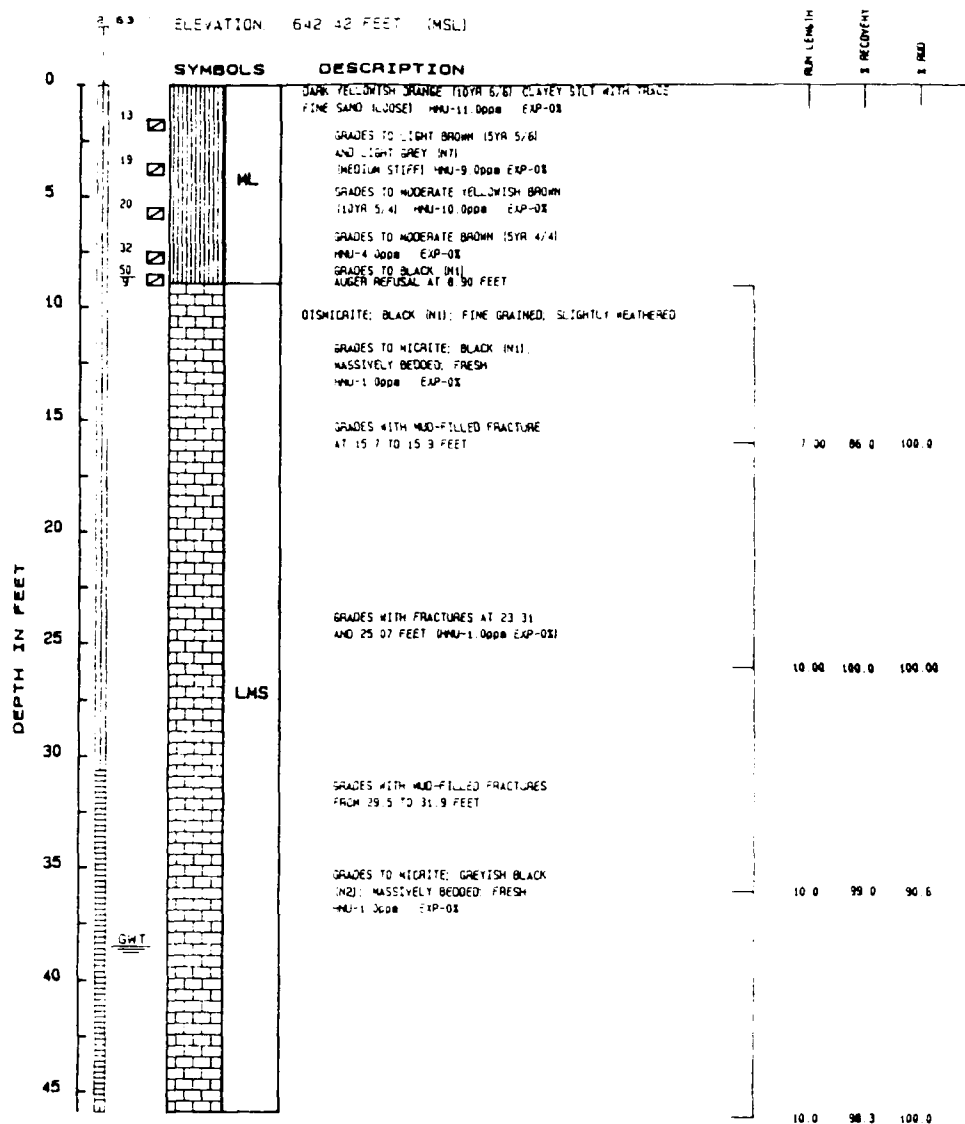
ELEVATION: 653 65 FEET (MSL)



LOG OF WELLS
DAMES & MOORE
PLATE 6

WAT 019114

WELL B-2



WELL TERMINATED AT 45.9 FEET ON 8/21/87
 GROUND WATER LEVEL RECORDED AT 38.5 FEET ON 8/22/87
 2-INCH DIAMETER PVC CASING WITH NO. 10 SLOTTED SCREEN INSTALLED

KEY
 — STANDARD BLOW COUNT
 — SLUGS PER FOOT EXCEPT AS NOTED
 [] STANDARD SPLIT SPOON SAMPLER (SP1)

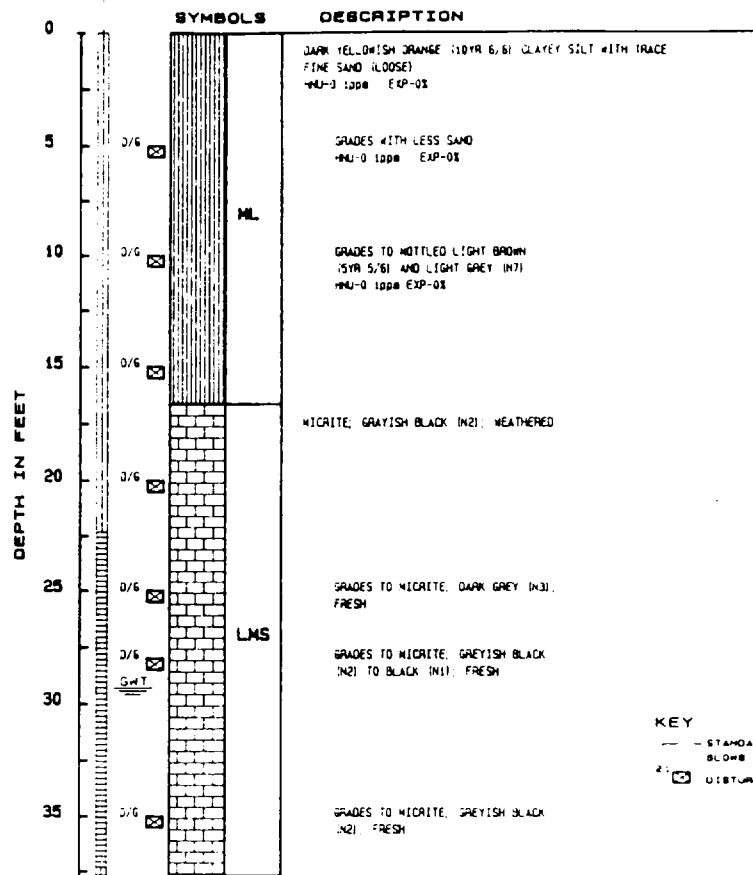
WELL CONSTRUCTION
 [] WELL CASING
 [] WELL SCREEN
 [] OPEN HOLE

LOG OF WELLS
 DAMES & MOORE
 PLATE 7

WAT 019115

WELL B-3

ELEVATION: 652.39 FEET (MSL)



WELL TERMINATED AT 37.7 FEET ON 8/22/87
GROUND WATER LEVEL RECORDED AT 29.3 FEET ON 8/23/87
2-INCH DIAMETER PVC CASING WITH NO. 10 SLOTTED SCREEN INSTALLED

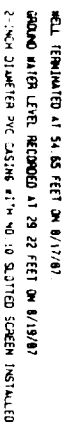
KEY
— STANDARD BLOW COUNT
BLOWS PER FOOT EXCEPT AS NOTED
3/6 DISTURBED OR GRAB SAMPLE

WELL CONSTRUCTION
WELL CASING
WELL SCREEN
OPEN HOLE

LOG OF WELLS
DAMES & MOORE
PLATE 8

WAT 019116

4. ELEVATION: 321 08 FEET (MSL)



STANDARD BLOW COUNT
BLOW PER FOOT EXCEPT AS NOTED
STANDARD SPLIT SPOON SAMPLER IDENT

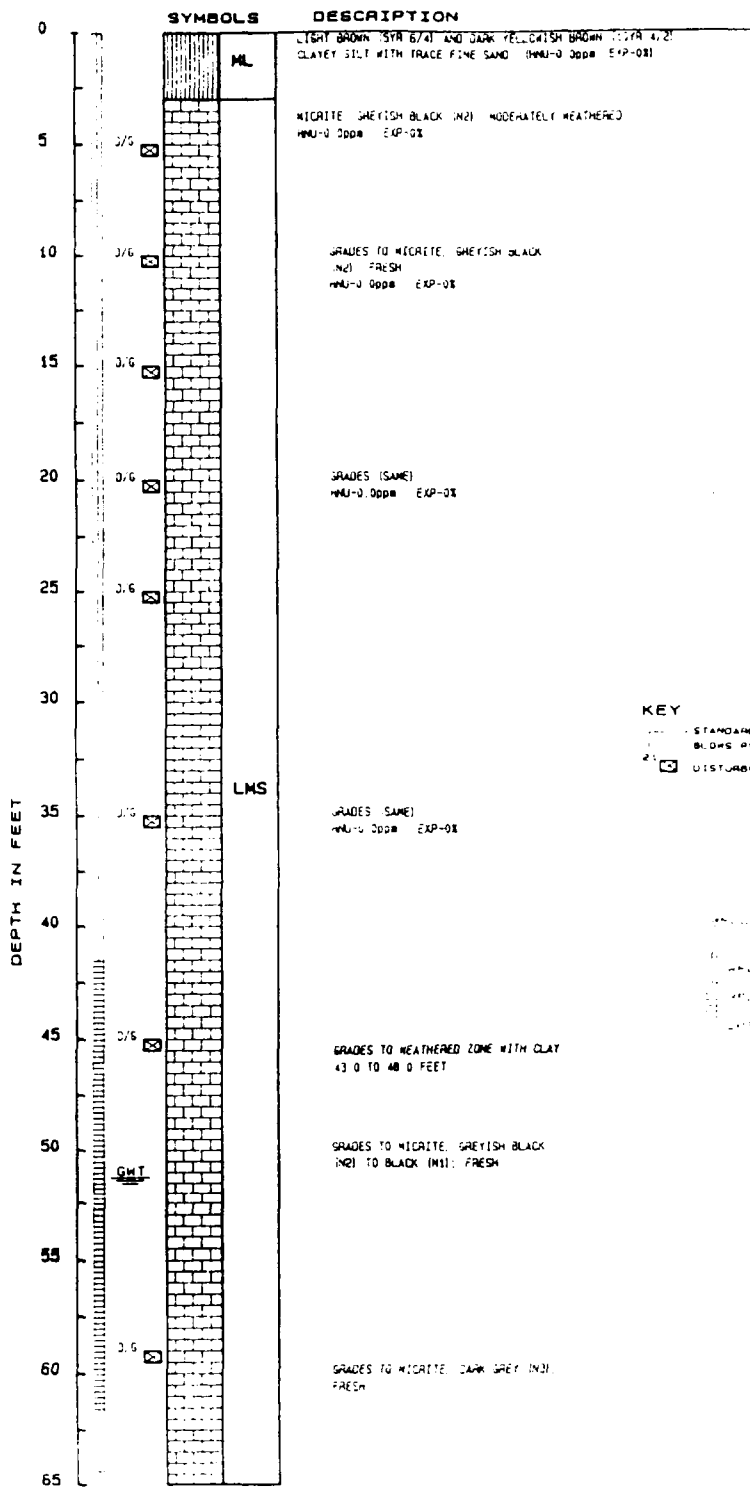
DATE	TIME	LOCATION	REMARKS
10/10/64	10:00	REU CASING	
10/10/64	10:00	REU SCREEN	
10/10/64	10:00	REU TONE	

DAMES & MOORE

WAT 019117

WELL C-2

ELEVATION 662.69 FEET (MSL)



WELL TERMINATED AT 65 FEET ON 8/13/87

GROUND WATER LEVEL RECORDED AT 51.2 FEET ON 8/13/87

2-INCH DIAMETER PVC CASING WITH NO. 10 SLOTTED SCREEN INSTALLED

LOG OF WELLS

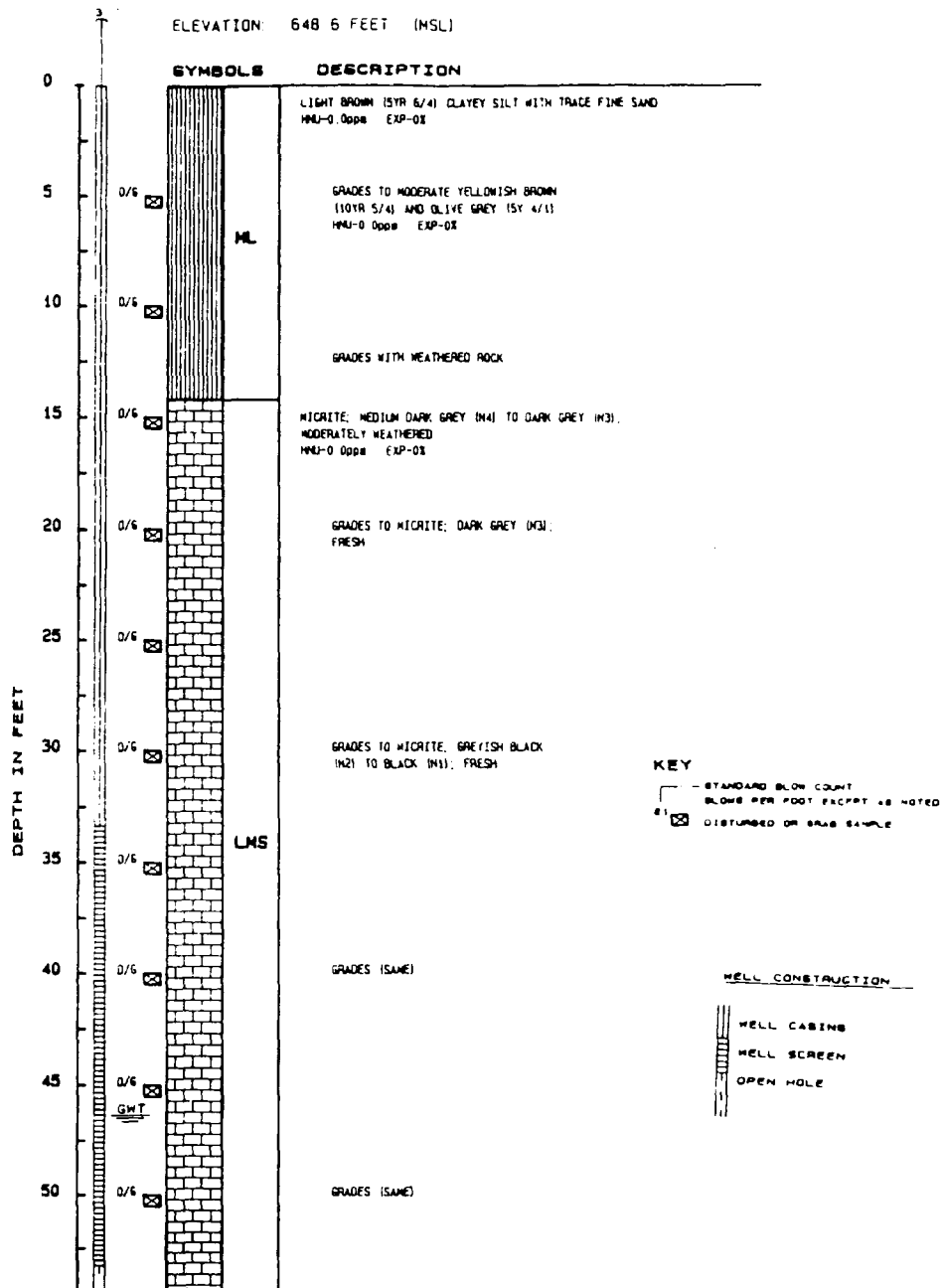
DAMES & MOORE

PLATE 10

WAT 019118

WELL C-3

ELEVATION: 648.6 FEET (MSL)



LOG OF WELLS

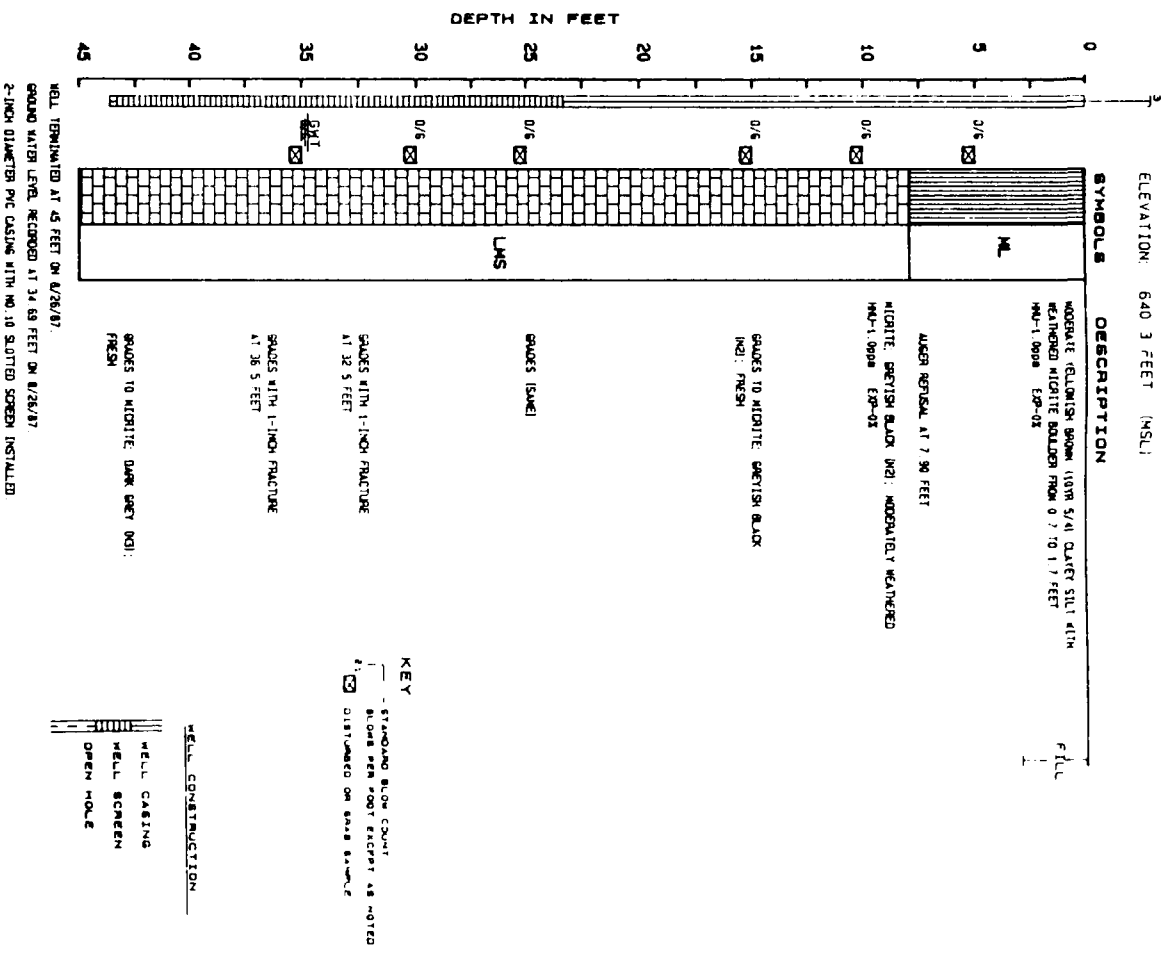
DAMES & MOORE

PLATE 11

WAT 019119

WELL C-4

ELEVATION: 640.3 FEET (MSL)



LOG OF WELLS

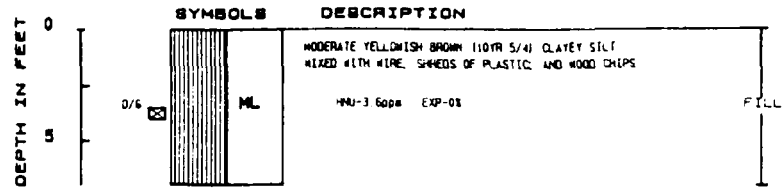
DAMES & MOORE

PLATE 12

WAT 019120

WELL C-4A

ELEVATION: 643 FEET (ESTIMATED)



WELL TERMINATED AT 7 FEET ON 8/22/87.
 GROUND WATER NOT ENCOUNTERED
 WELL ABANDONED IN FILL MATERIAL AS AUGER STRUCK STATIGERY OBJECT
 WELL GROUTED TO SURFACE WITH 1/4-INCH BENTONITE PELLETS.

KEY
 - STANDARD BLOW COUNT
 BLOWN PER FOOT EXCEPT AS NOTED
 [X] DISTURBED OR BRAB SAMPLE

WELL CONSTRUCTION

WELL CASING
 WELL SCREEN
 OPEN HOLE

LOG OF WELLS
 DAMES & MOORE
 PLATE 13

WAT 019121

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WAT 019122

Shimada & Co.

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Janette M. Davis
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(912) 354-7858



LOG NO: 87-3040

Received: 12 SEP 87

Mr. John Meadows
Dames & Moore
455 East Paces Ferry Road, Suite 200
Atlanta, GA 30363

Project: 1674-166 (Rome, GA)

REPORT OF ANALYTICAL RESULTS

Page 2

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES					SAMPLED BY
3040-6	B-2	9/10/87				Client
3040-7	B-3	9/10/87				
3040-8	C-1	9/10/87				
3040-9	C-2	9/10/87				
3040-10	C-3	9/10/87				
PARAMETER	3040-6	3040-7	3040-8	3040-9	3040-10	
pH, units	7.3	7.2	7.4	7.3	7.6	
Specific Conductance, umhos/cm	700	700	550	900	650	
Total Organic Carbon, mg/l	23	17	3.7	4.2	3.8	
Total Organic Halogen, mg/l	0.07	0.04	0.06	0.08	0.06	

Methods: EPA 40 CFR Part 136

PLATE 15

WAT 019123

James W. Andrews, Ph.D.
President

Janette M. Davis
Vice-President

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REPORT OF ANALYTICAL RESULTS

Page 3

LOG NO	SAMPLE DESCRIPTION , LIQUID SAMPLES	SAMPLED BY
3040-11	C-4 9/10/87	Client
PARAMETER	3040-11	
pH, units	7.2	
Specific Conductance, umhos/cm	600	
Total Organic Carbon, mg/l	24	
Total Organic Halogen, mg/l	0.20	

Methods: EPA 40 CFR Part 136

Janette Davis Long
Janette Davis Long

PLATE 16

WAT 019124

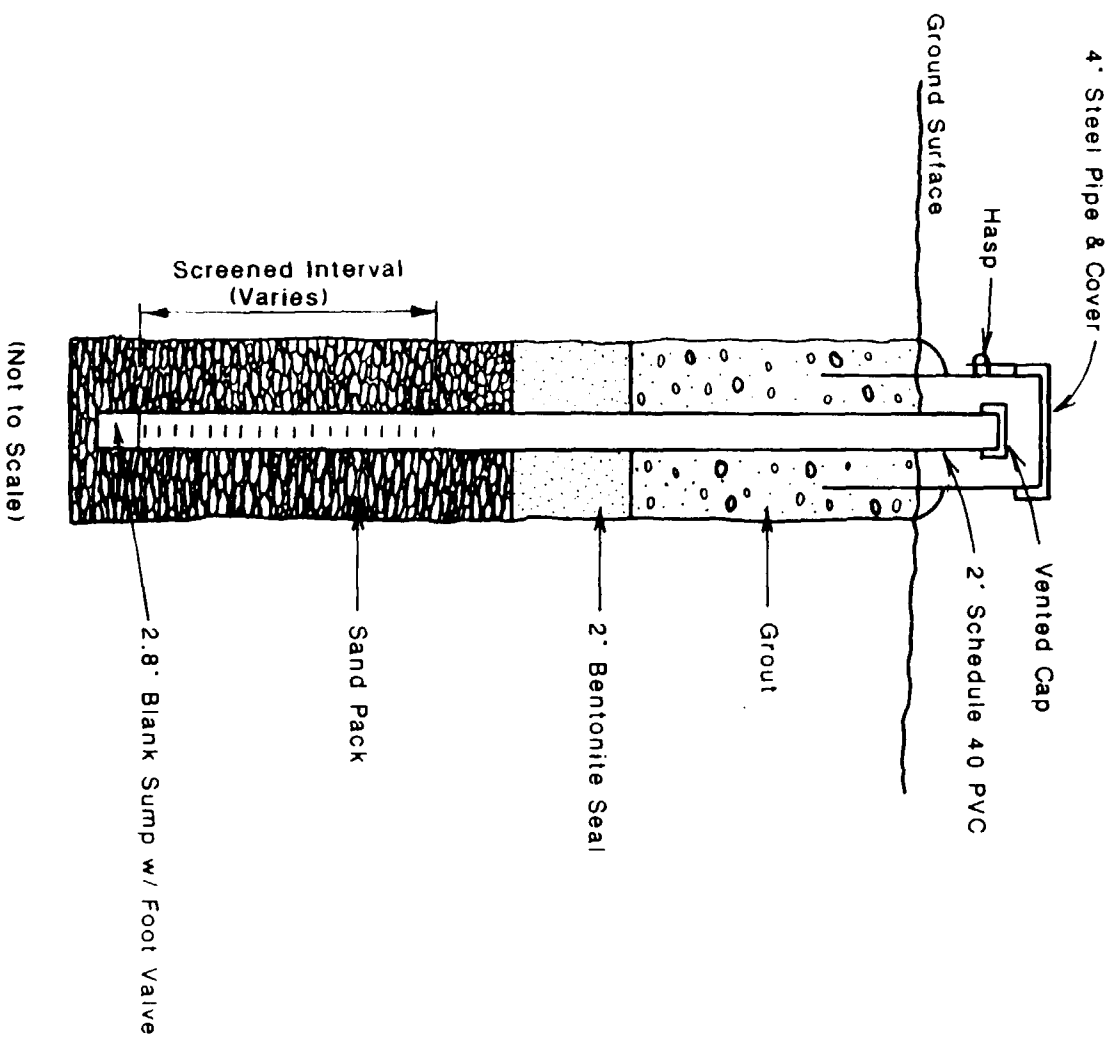


Exhibit C
TYPICAL MONITORING WELL INSTALLATION

General Electric Company
Rome, Georgia

Dames & Moore

WAT 019125

Table 5-2
Water Level Measurements
9/11/87 Sampling

<u>Well No.</u>	<u>TOC Elevation (MSL)</u>	<u>Water level (BTOC)</u>	<u>Water level (BGL)</u>	<u>Water level (MSL)</u>
A1	656.75	20.00	17.33	636.75
A2	651.68	23.00	19.75	628.68
A3	654.19	22.91	20.66	631.28
A4	659.77	28.92	25.92	630.85
B1	656.65	15.13	12.13	641.52
B2	645.05	43.54	40.91	601.51
B3	655.39	16.93	13.93	638.46
C1	655.05	40.34	37.17	614.71
C2	665.39	44.88	42.18	620.51
C3	651.48	41.18	38.18	610.30
C4	643.78	10.27	7.27	633.51

TOC - Top of casing

BTOC - feet below top of casing

BGL - feet below ground level

MSL - feet above mean sea level

Table 6-1
Water Chemistry Results
9/10/87 Sampling

<u>Well No.</u>	<u>pH (units)</u>	<u>Specific Conductance (umhos/cm)</u>	<u>Total Organic Carbon (mg/l)</u>	<u>Total Organic Halogen (mg/l)</u>
A1	4.5	950	13	1.1
A2	6.0	320	22	0.09
A3	7.1	550	6.7	0.42
A4	6.9	550	19	0.81
B1	6.8	750	3.5	0.09
B2	7.3	700	23	0.07
B3	7.2	700	17	0.04
C1	7.4	550	3.7	0.06
C2	7.3	900	4.2	0.08
C3	7.6	650	3.8	0.06
C4	7.2	600	24	0.20

